2007 RESEARCH PROBLEM STATEMENT

Problem Title: Determining Wildlife Use of Wildlife Crossing Structures Under Different Scenarios **No.:** 07.04-1

Submitted By: Patricia Cramer, PhD **Email:** pcramer@cc.usu.edu

Project Champion: Shane Marshall

(UDOT or FHWA employee who needs this research done, will help the Research Division lead this project, and will spearhead the implementation of the results. If the project gets prioritized at the UTRAC conference, a Champion Commitment Form will be required before funding.)

1. Briefly describe the problem to be addressed

Wildlife-vehicle collisions in Utah are a concern for the safety of the traveling public and the survival of deer, elk, and moose populations. As US Highway 6, Interstate 70 and other highways are expanded and upgraded in the coming years, wildlife crossing structures will need to be built to accommodate these large ungulates under the road surface in order to minimize such crashes. There is little knowledge of wildlife use of existing bridges and culverts and what parameters of wildlife crossings are most important to mule deer, elk, and moose.

Highways in Utah have many miles of big game fencing which prevents animals from accessing traditional migration routes, or in the case of the unfenced reaches, have high wildlife mortality and vehicle accident rates. Some efforts have been tried to retro-fit the freeways or force animals to use existing structures (box culverts, overpasses, simple-span bridges, etc.). The problem is that some structures are readily accepted by mule deer and elk (simple-span bridges) while others are not (cement box culverts, corrugated steel culverts, arched box designs etc.). Elk particularly do not use culvert designs and require very large and expensive over/under pass structures. The question to be answered is what minimum designs will be readily used by most elk, but save the most on construction costs?

If we can begin to understand wildlife use of passages regarding dimensions and openness, we can better plan and build wildlife crossing structures with knowledge of what the minimal requirements are for these species in general. This knowledge has the potential to save thousands of dollars in future wildlife crossings.

We propose a pilot study to 1) determine the species, numbers, and peak migration times of wildlife using of the area underneath the existing bridge structures on US- 6, I-70, US 89/91, I-15 etc. , 2) determine how the construction of the proposed new bridge in the area affects wildlife movement through the area 3) determine the effectiveness of the new bridge structure in facilitating wildlife movement under Highway 6, and 4) create an experimental situation that uses removable doors-gates-curtains attached to the underside of the future bridge or *another bridge in the area* that would be adjusted to change the dimensions of the openings of the entrances and determine wildlife use of the passage under different dimension scenarios. This pilot project would also help determine the feasibility of using these gates for future research.

2. Strategic Goal: Preservation ☒ Operation ☐ Capacity ☒ Safety (check all that apply)

3A. List the research objective(s) to be accomplished:

Phase I

1. What over/underpass structure designs work for both deer and elk on Utah's highways?

To determine existing wildlife use of area under current bridge on Highway 6 near milepost 200 (Structure C-287). Phase 2

1. Determine the post construction effectiveness of wildlife use, at the new US-6 bridge at milepost 200.

2. To begin to understand the effects of variables (height, depth, width, slope, ambient light, and configuration) that influence wildlife use of crossing structures.

2.To determine feasibility of adjusting entrances of passages under span bridges with designed doors-gates-curtains.

3B. List the major tasks to accomplish the research objective(s): **Estimated person-hours:** 7160

Phase I = 4160 hours
Phase II = 3000 hours
Final report with recommendations for range of minimum criteria for specific dimensions of passage that were measured in this study for passing mule deer, elk, and moose along US 6, assuming these three species were recorded using the passages. Recommendations for the continuation of similar studies that build on the methods used in this pilot study.

4. Estimate the cost of this research study including implementation effort (use person-hours from No. 3B):

Phase I: Monitor wildlife use of existing passage for species that use the structures & future comparisons 2007-2009:
Sub Total = $150,000
Phase II: Monitor wildlife use of highway 6 passage during 2009-2011. Design doors/gates, monitor wildlife use of new passage as constructed, then install doors/gates & monitor reactions, analyze results,
Sub Total = $70,000

Total requested for Phases I, II = $220,000
Note: Additional Contribution for Phase II by Utah Transportation Center @ USU = $30,000

5. Indicate type of research and/or development project this is

Large: ☒ Research Project ☒ Development Project
Small: ☐ Research Evaluation ☐ Experimental Feature ☐ New Product Evaluation ☐ Tech Transfer Initiative
☐ Other: _____

(A small project is usually less than $20,000 and shorter than 6 months)

6. Outline the proposed schedule (when do you need this done, and how will we get there):

Phase I: 2007-2009

1. Install cameras at existing bridges and culverts , to monitor wildlife use in current situation
2. Develop report that outlines wildlife use of the existing crossings.

Phase II: 2009-2011

1. Monitor wildlife use of area during construction of new bridge structure on Highway 6
2. Enroll engineering master's student in USU Civil Engineering/Utah Transportation Center
3. Design a system of roll out doors, slide gates, and/or curtains that fit under a bridge, that allows control of the size width, height, or slope of the entrances to area under the bridge passage
4. Monitor wildlife use of new structure with no modifications
5. Install roll out doors-slide gates in new passage (UDOT) and begin experimental changes in dimensions of opening
6. Monitor wildlife reaction to new changes in dimensions of passage entrance
7. Review results, adaptively manage the situation to the results, create report.

7. What type of entity is best suited to perform this project (University, Consultant, UDOT Staff, Other Agency, Other)?

University entity is best suited for this project, with transportation ecology experts, and engineering students involved in design of gates-doors.

8A. What deliverables would you like to receive at the end of this project? (e.g. useable technical product, design method, technique, training, workshops, report, manual of practice, policy, procedure, specification, standard, software, hardware, equipment, training tool, etc.)

Phase I - Interim Report

Phase II

The final products from this project will be useable technical information on design specifications for wildlife crossing structures for mule deer, elk, and moose or what species of this list were recorded using the wildlife crossing structures and original bridge along Utah roadways..

An engineer-designed methodology for experimentally changing the dimensions of the size of wildlife passage under bridges.

8B. Describe how this project will be implemented at UDOT.

The P.I. on the project would work with the Environmental Division professionals such as Shane Marshall and Technical Advisory Committee members in implementing the research and making appropriate changes along the way.

UDOT would need to install the sliding gates-roll out doors that change the dimensions of the underpass. UDOT would also need to change the sizes of the entrance with these gates/doors on possibly a monthly basis in Phase II .

8C. Describe how UDOT will benefit from the implementation of this project, and who the beneficiaries will be.

UDOT would benefit from the implementation of this project by learning of the minimum size criteria for mule deer, elk, and moose passage under UtahHighways. . The smaller the size of the bridge necessary for wildlife to pass under the roadway, the greater cost savings to UDOT. UDOT would also be able to gauge the efficacy of the old and new wildlife crossing structures and could better judge the benefit-cost ratios with this data than if the monitoring does not occur.

9. Describe the expected risks and obstacles as well as the strategies to overcome them.

Obstacles:

Designing doors-gates large enough to cover most of entrance under bridge, but handleable enough to move on a potential monthly basis. Coordination with UDOT on installing and removing or rolling back these structures.

Construction delays of the new bridge which would delay later phases of this research.

Risk:

Theft of cameras.

Safety of UDOT crews working on installing gates-doors, and researchers checking cameras.

10A. List other people (UDOT and non-UDOT) who are willing to participate in the Technical Advisory Committee (TAC) for this study:

Name	Organization / Division / Region	Phone	Email
Shane Marshall	Environmental Program Manager	(801) 965-4784	SMARSHALL@utah.gov
John Bissonette	Leader of USGS Utah Cooperative Research Unit, Professor of Wildland Resources Dept. Utah State University	(435) 797.2511	john.bissonette@usu.edu
John Higgins	UDOT Engineer, UDOT R-3	(801) 227.8031	jhiggins@utah.gov
Bruce Bonebrake	UDWR/Cedar City	(435) 865-6111	brucebonebrake@utah.gov
Daryl Friant		(435) 893-4754	
Randall Taylor	UDOT/Richfield	(435) 893-4714	randalltaylor@utah.gov
Nathan Merrill	UDOT / Cedar City	(435) 865-5509	nmerrill@utah.gov
Paul West	UDOT / Wildlife Program Manager	(801) 965-4672	paulwest@utah.gov

10B. Identify other Utah, regional, or national agencies and other groups that may have an interest in supporting this study:

Federal Highways, Office of Natural and Human Environment
Utah State University, Utah Transportation Center, Department of Civil and Environmental Engineering ($30,000)
Sate of Utah Division of Wildlife
ICOET
US Fish and Wildlife Service
BLM
US Forest Service
Other State DOTs and Wildlife Divisions
Mule Deer Foundation
Rocky Mountain Elk Foundation